MERMENTAU RIVER TMDL FOR AMMONIA

SUBSEGMENT 050401

US EPA Region 6

Final

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily pollutant loads for those waterbodies. A total maximum daily load (TMDL) is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint sources discharging to the waterbody. A TMDL has been developed for ammonia for the Mermentau River.

The Mermentau River, Subsegment 050401, was listed on the October 28, 1999 Court Ordered §303(d) List as not fully supporting the water quality standard for propagation of fish and wildlife and was ranked as a high priority for TMDL development. The Mermentau River was listed on the October 28, 1999 Court Ordered §303(d) list for ammonia by virtue of its listing in the State of Louisiana's 1993 Nonpoint Source (NPS) Report. This subsegment was listed as "impacted by nonpoint source pollution", with ammonia listed as one of the suspected causes of impact (LDEQ 1993). There is presently no criterion available for ammonia in the State's water quality standards. With no ammonia criterion available to establish a TMDL target, an alternative approach was used. On April 29, 1996, LDEQ issued a declaratory ruling which states: "That DO directly correlates with overall nutrient impact is a well-established biological and ecological principle. Thus, when the LDEQ maintains and protects DO, the LDEQ is in effect also limiting and controlling nutrient concentrations and impacts." DO serves as an indicator for which a water quality criterion exists and is used in the assessment of use support. Therefore, in this TMDL, the ammonia loading required to maintain the dissolved oxygen standard serves as the ammonia TMDL.

This ammonia TMDL includes five wasteload allocations, a load allocation, and a margin of safety. As presented in LDEQ (1999), the summer season DO criterion of 3.0 mg/L can be maintained with a 30% reduction of all manmade nonpoint sources and implementation of the wasteload allocations (WLAs) for point source dischargers presented in Table 2 of this report. For the winter season, the DO criterion of 5.0 mg/L can be maintained with a 30% reduction from all manmade nonpoint sources and implementation of the WLAs for point source dischargers presented in Table 2. This also assumes the imposition of the point and nonpoint load reductions required in the Bayou Nezpique, Bayou Des Cannes, Bayou Plaquemine Brule and Bayou Queue de Tortue Summer and Winter TMDLs. The output of these waterbodies' summer and winter projections were inputs into the Mermentau River summer and winter projections.

1. Introduction

The Mermentau River, Subsegment 050401, was listed on the October 28, 1999 Court Ordered §303(d) list as not fully supporting the water quality standard for the propagation of fish and wildlife and was ranked as a high priority for TMDL development. TMDLs for ammonia were developed in accordance with the requirements of Section 303(d) of the federal Clean Water Act. The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant; the TMDL also establishes the load reduction that is necessary to meet the standard in a waterbody. The TMDL consists of the wasteload allocation (WLA), the load allocation (LA), and a margin of safety (MOS). The wasteload allocation is the load allocated to point sources of the pollutant of concern, and the load allocation is the load allocated to nonpoint sources. The margin of safety is a percentage of the TMDL that accounts for the uncertainty associated with the model assumptions and data inadequacies.

2. Study Area Description

Water quality subsegment 050401 includes that portion of the Mermentau River from its origin to Lake Arthur. The Mermentau River Basin encompasses the prairie region of the state and a section of the coastal zone. The drainage area for the Basin, excluding the gulf water segment, is 3,710 square miles (LDEQ 1987). The streams of the Mermentau Basin are characteristically sluggish due to the gradual slope of the land toward the Gulf. Fish kills have been commonly reported throughout the basin. Additionally, it has been suggested that the water quality problems in the basin may be largely due to agricultural runoff and hydrologic modification (LDEQ 1990).

2.1 Mermentau River, Subsegment 050401

Subsegment 050401 is located in south central Louisiana in the parishes of Vermilion, Acadia and Jefferson Davis and has a drainage area of 67.11 square miles. The subsegment is prairie, characterized by large expanses of flat grassland and scattered areas of oak trees and other mixed hardwoods. Much of the area adjoining the water body is hardwood swamp with water depths of 1'-3' extending approximately 50' to 300' out from the river. The slope of the land is generally north to south. Because of its relatively low relief the region is characterized by poor drainage and annual backwater flooding of agricultural lands. The land use in the watershed is vividly depicted on the SPOT-TM map in Appendix L of LDEQ (1999) and summarized in Table 1 below. See LDEQ (1999) for additional discussion of the study area.

Table 1. Land Uses in Segment 0504

LAND USE TYPE	NUMBER OF ACRES	% OF TOTAL AREA
Urban	1,994	2.60
Extractive	105	0.10
Agricultural	51,059	67.20
Forest Land	5,176	6.80
Water	5,553	7.30
Wetland	12,055	15.90
Barren Land	58	0.10
TOTAL AREA	76,000	100.00

2.2 Water Quality Standards

The designated uses for the Mermentau River include primary and secondary contact recreation and propagation of fish and wildlife. The Mermentau River was listed on the October 28, 1999 Court Ordered §303(d) list for ammonia by virtue of its listing in the State of Louisiana's 1993 Nonpoint Source (NPS) Report. This subsegment was listed as "impacted by nonpoint source pollution", with ammonia listed as one of the suspected causes of impact (LDEQ 1993). There is presently no criterion available for ammonia in the State's water quality standards (LDEQ 2000).

With no ammonia criterion available to establish a TMDL target, an alternative approach was used. On April 29, 1996, LDEQ issued a declaratory ruling which states: "That DO directly correlates with overall nutrient impact is a well-established biological and ecological principle. Thus, when the LDEQ maintains and protects DO, the LDEQ is in effect also limiting and controlling nutrient concentrations and impacts." DO serves as an indicator for which a water quality criterion exists and is used in the assessment of use support. Therefore, in this TMDL, the ammonia loading required to maintain the dissolved oxygen standard serves as the ammonia TMDL.

The applicable dissolved oxygen criteria are as follows:

Season	Temperature (^{o}C)	DO(mg/L)
Summer (March - November)	32	3.0
Winter (December - February)	32	5.0

2.3 Identification of Sources

The sources identified in the *1998 Louisiana Water Quality Inventory* as affecting the water quality of the Mermentau River are municipal and industrial point sources, agriculture sources, stormwater loadings and natural background benthic materials (LDEQ 1998). The 1993 Nonpoint Source Pollution Assessment Report also specifically lists irrigated crop production, aquaculture, urban runoff, landfills, land disposal runoff and leaching, and petroleum activities as additional suspected sources of pollution (LDEQ 1993).

Table 2. Point Source Wasteload Allocations

Dischargers to the Mermentau River									
Facility	Permit #	Receiving Water	Discharge Flow MGD	Summer CBOD5/ NH3-N mg/l	Winter CBOD5/ NH3-N mg/l	Summer CBOD5 WLA lbs/day	Summer NH3-N WLA lbs/day	Winter CBOD5 WLA lbs/day	Winter NH3-N WLA lbs/day
Village of Mermentau		Mermentau River	0.085	10/10	10/10	7.10	7.10	7.10	7.10
BCI LA/Shepherd Oil ethanol plant		Mermentau River	1.4	10/10	20/10	116.76	116.76	233.52	116.76
Lake Shore Club *	LAG530328	Mermentau River	0.005	30/15	30/15	1.25	0.63	1.25	0.63
Trailer Town Trailer Park*	LAG530098	Mermentau River	0.005	30/15	30/15	1.25	0.63	1.25	0.63
Leevac Shipyards, Inc*	LA0102997	Mermentau River	0.004	30/15	30/15	1.00	0.50	1.00	0.50
		TOTAL	1.495			127.36	125.62	244.12	125.62
		TOTAL (NH3-N * 4.3=UNBOD)					540.17		540.17
		TOTAL (CBOD5 * 2.3=UCBOD)				292.93		561.48	

*Note: For the last three dischargers listed above, we have assumed $CBOD_5$ and NH_3-N concentrations as 30mg/L and 15 mg/L, respectively. The source of discharge information was EPA's NPDES Imaging System.

2.3.1 Point Sources

There are five permitted facilities with known flow information discharging sanitary wastewater into the Mermentau River and its tributaries (see Table 2). Nutrient contributions from the point source dischargers will be controlled through NPDES permit limits for NH_3-N.

2.3.2 Nonpoint Sources

The predominant land use along the Mermentau River is agriculture. Agricultural activities can contribute to ammonia loads through runoff, however, it is presently unknown to what relative extent these activities contribute to ammonia loads. The watershed is sparsely populated outside of the small municipalities. These rural residences may also contribute to the nutrient load if they have septic tanks or septic fields for their wastewater treatment.

3. TMDL Load Calculations

LDEQ submitted a DO model for the Mermentau River subsegment 050401 in November 1999 (LDEQ 1999). The model was reviewed and approved by EPA. This model was used to address the ammonia listing for this segment. Table 5 of the DO TMDL modeling report presents cumulative WLAs, LAs, and MOS for two point source dischargers (LDEQ 1999). For the additional three minor dischargers, WLAs were calculated based on $CBOD_5$ and NH_3-N concentrations of 30 mg/L and 15 mg/L, respectively. For these three minor dischargers, the $CBOD_5$ and NH_3-N concentrations were selected based on the existing treatment processes currently being utilized. However, if a facility's existing permit contains more stringent limits for $CBOD_5$ and NH_3-N, those stringent limits should be used. Tables 2 and 3 present the WLAs, LAs, and MOS for this ammonia TMDL.

3.1 Loading Capacity and TMDL Formulation

According to LDEQ (1999), input data for the calibration model was developed from the LDEQ Reference Stream Study; data collected during the July, 1982 LDEQ field survey; data collected by LDEQ at several ambient monitoring stations in the watershed; DMRs , permits and permit applications for each of the point source dischargers; USGS drainage area and low flow publications; USGS daily flow stations; previous modeling studies conducted by LDEQ in the area; and data garnered from several previous LDEQ studies on nonpoint source loadings. A satisfactory calibration was achieved for the main stem. In those cases where the calibration was not as accurate (primarily due to limited data), a conservative approach was taken. For the projection models, data was taken from the current LDEQ/EPA discharge permits, current applications, and LDEQ ambient temperature records. The Louisiana Total Maximum Daily Load Technical Procedures have been followed in this study (Aguillard 1999).

Modeling was limited to low flow scenarios for both the calibration and the projections since the constituent of concern was dissolved oxygen and the available data was limited to low flow conditions. The model used for this TMDL was LA-QUAL, a steady-state one-dimensional water quality model. In 1999, the LDEQ and Wiland Consulting, Inc. developed LA-QUAL based on QUAL-TX Version 3.4. The program was converted from a DOS-based program to a

Windows-based program with a graphical interface and enhanced graphic output. Other program modifications specific to the needs of Louisiana and the LDEQ were also made. LA-QUAL is a user-oriented model and is intended to provide the basis for evaluating total maximum daily loads in the State of Louisiana.

3.2 Load Allocations

Seasonal load allocations are presented in Table 3. See LDEQ (1999) for a detailed discussion of load allocation. The natural/manmade nonpoint source LA in Table 3 is calculated using the manmade nonpoint source LAs presented in Table 5 of LDEQ (1999) minus WLAs for three minor discharges (Permit #'s LAG530328, LAG530098, and LA0102997) presented in Table 2 of this report.

As presented in LDEQ (1999), the summer season DO criterion of 3.0 mg/L can be maintained with a 30% reduction of all manmade nonpoint sources and implementation of the WLAs for the point source dischargers as presented in Table 2 of this report. This also assumes the imposition of the point and nonpoint load reductions required in the Bayou Nezpique, Bayou Des Cannes, Bayou Plaquemine Brule and Bayou Que de Tortue Summer TMDLs. The outputs of these waterbodies' summer projections were inputs into the Mermentau River summer projection. For the winter season, the DO criterion of 5.0 mg/L can be maintained with a 30% reduction from all manmade nonpoint sources and implementation of the WLAs for the point source dischargers as presented in Table 2 of this report. This also assumes the imposition of the point and nonpoint load reductions required in the Bayou Nezpique, Bayou Des Cannes, Bayou Plaquemine Brule and Bayou Que de Tortue Winter TMDLs. The outputs of these waterbodies' winter projections were inputs into the Mermentau River winter projection.

Table 3. Total Maximum Daily Loads
(UBOD = UCBOD + UNBOD)

ALLOCATION	SUMMER (MAR-NOV) (lbs/day)	WINTER (DEC-FEB) (lbs/day)
Point Source WLA	833	1,102
Point Source Reserve MOS	208	275
Natural/Manmade Nonpoint Source LA	37,686	35,965
Headwater/Tributary Source LA	2,188	5,412
TMDL = WLA + LA + MOS	40,915	42,754

3.3 Wasteload Allocations

Seasonal wasteload allocations for individual point source dischargers are presented in Table 2. The total cumulative WLAs for summer and winter are presented in Table 3.

3.4 Seasonal Variation

Critical conditions for dissolved oxygen in Louisiana have been determined to be when there is negligible nonpoint run-off and low stream flow combined with high stream temperature. In

addition, the models account for loadings that occur at higher flows by modeling sediment oxygen demand. Oxygen demanding pollutants that enter the stream during higher flows settle to the bottom and then exert the greatest oxygen demand during the high temperature seasons. Additionally, this TMDL looked at the winter and summer seasons by varying temperature.

3.5 Margin of Safety

The point source reserve margin of safety (MOS) presented in Table 3 was taken from Table 5 of LDEQ (1999). The MOS accounts for any lack of knowledge or uncertainty concerning the relationship between load allocations and water quality. According to LDEQ (1999), the highest temperatures occur in July-August, the lowest stream flows occur in October-November, and the maximum point source discharge occurs following a significant rainfall, i.e. high-flow conditions. The combination of these conditions, in addition to other conservative assumptions regarding rates and loadings, yields an implied MOS estimated to be in excess of 10%. In addition to the implied MOS, LDEQ used an explicit MOS of 20% for the point source loads in Table 5 of its report. An equivalent explicit MOS of 20% was also used in this TMDL.

4. Other Relevant Information

Although not required by this TMDL, LDEQ utilizes funds under Section 106 of the federal Clean Water Act and under the authority of the Louisiana Environmental Quality Act to operate an established program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term data base for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for the LDEQ nonpoint source program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been implemented by the time the first priority basins will be monitored again in the second five-year cycle. This will allow the LDEQ to determine whether there has been any improvement in water quality following establishment of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list. The sampling schedule for the first five-year cycle is shown below. The Mermentau River Basin will be sampled again in 2003.

1998 – Mermentau and Vermilion-Teche River Basins

1999 - Calcasieu and Ouachita River Basins
2000 – Barataria and Terrebonne Basins
2001 – Lake Pontchartrain Basin and Pearl River Basin
2002 – Red and Sabine River Basins

(Atchafalaya and Mississippi Rivers will be sampled continuously.)

In addition to ambient water quality sampling in the priority basins, the LDEQ has increased compliance monitoring in those basins, following the same schedule. Approximately 1,000 to 1,100 permitted facilities in the priority basins were targeted for inspections. The goal set by LDEQ was to inspect all of those facilities on the list and to sample 1/3 of the minors and 1/3 of the majors. During 1998, 476 compliance evaluation inspections and 165 compliance sampling inspections were conducted throughout the Mermentau and Vermilion-Teche River Basins.

5. Public Participation

When EPA establishes a TMDL, 40 C.F.R. § 130.7(d)(2) requires EPA to publicly notice and seek comment concerning the TMDL. Pursuant to an October 1, 1999, Court Order, EPA prepared this TMDL. After submission of this TMDL to the Court, EPA commenced preparation of a notice seeking comments, information and data from the general and affected public. Comments and additional information were submitted during the public comment period and this Court Ordered TMDL was revised accordingly. EPA has transmitted this revised TMDL to the Court, and to the Louisiana Department of Environmental Quality (LDEQ) for incorporation into LDEQ's current water quality management plan.

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